

AD 645999

REPORT NUMBER 155

MARCH 1965

NOSE LANDING GEAR DROP TEST REPORT

XV-5A
LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM

CONTRACT NUMBER DA44-177-TC-715

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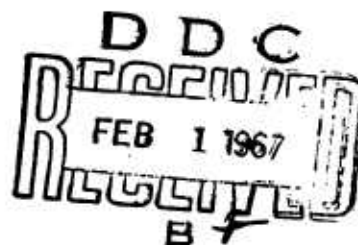
REPORT NUMBER 155

NOSE LANDING GEAR DROP TEST REPORT

XV-5A Lift Fan
Flight Research Aircraft Program

March 1965

ADVANCED ENGINE AND TECHNOLOGY DEPARTMENT
GENERAL ELECTRIC COMPANY
CINCINNATI, OHIO 45215



18 JUN 1966
7 JUN 1966

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H. W. LOUD MACHINE WORKS, Inc.
POMONA, CALIFORNIA

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1.0 GENERAL:

The 1511L100 Nose Landing Gear Shock Strut was tested on 26 July 1963, in accordance to the H. W. Loud Test Procedure 1511LTP-4, Revision "A". This report presents the successful completion of the established test requirements.

The tests were witnessed by Ryan and H. W. Loud Quality Control and Mr. Fred Doring, F. A. A. Western Regional Headquarters.

2.0 APPLICABLE DOCUMENTS:

- 2.1 1511LTP-4, Revision "A", H. W. Loud Drop Test Procedure
- 2.2 SCDL0002, Ryan Nose Gear Specification
- 2.3 Wire dated July 25, 1963 confirming test requirement deviation.

3.0 SUMMARY:

The results of the tests demonstrate satisfactory energy absorbtion characteristics of the shock absorber.

The first test condition results meets the requirements of the deviation allowance.(see Appendix B). The vertical reaction exceeds the original requirements for approximately .05 seconds at a strut stroke of 4.15 inches with a maximum of 6600 pounds.

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3.0 SUMMARY: (con't)

The second condition results meets the test requirements.

The official test for condition three was run with an additional 200 pounds on the jig that was anticipated to correct for friction in the drop tower. The results indicate, however, excessive energy input. A prior run is also included with the correct jig weight and with insufficient energy input to show the effect of the weight change. Both runs are well within the maximum allowable vertical reaction.

4.0 DISCUSSION:

The shock strut was mounted in the drop tower (See Figure I). The ground reactions were measured with a reaction platform (See Figure II). The strut was serviced with hydraulic fluid and extended with 154 psig air pressure. The tire was inflated to 155 psig.

The tests were performed in accordance with the 1511LTP-4 Test Procedure. See Appendix A for a copy of the test requirements taken from the procedure.

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4.0 DISCUSSION: (con't)

A deviation was granted by Ryan (See Appendix B) on condition number one allowing for an increase in vertical reaction to 7000 pounds after the first four inches of strut stroke.

Figure III shows the configuration of the metering pin and orifice.

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5.0

RESULTS:

The test results are given in Table I. The curves of vertical load vs stroke are given in Figures IV, V, VI, and VII. The actual test records are fold out pages

TABLE I

Record No.	9691	9687	9685	9680	
Results *	Cond. 1	Cond. 2	Cond. 3	Cond. 3 **	Units
Wheel Speed	2200	-	2570	2550	rpm
Max. Vertical Reaction	6600	8270	4070	3800	pounds
Max. Drag Reaction	2060	-	1760	1360	pounds
Jig Contact Velocity	10.02	10.0	6.1	6.1	feet/second
Total Strut Stroke	6.44	7.42	5.84	5.86	inches
Total Mass Travel	8.07	9.92	7.35	6.37	inches
Strut Efficiency	83.6	75.5	-	-	percent
Energy Absorbed	3670	5004	2190	1440	foot-pounds
Max. Vertical *** Reaction 0-4" Strut Stroke	6140	-	-	-	pounds

* See Appendix A for drop test requirements.

** Drop made prior to official tests not witnessed by required agencies.

*** See Appendix B.

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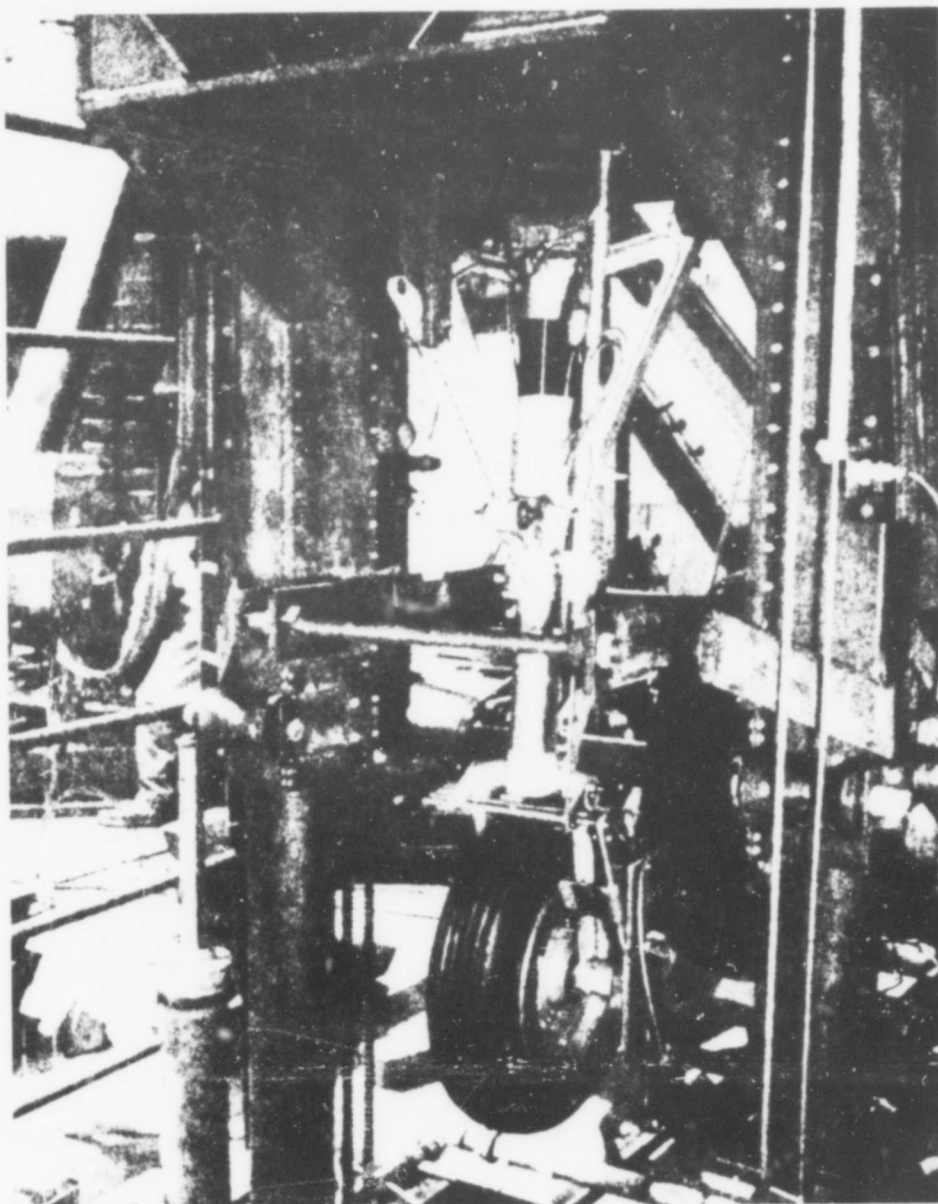


FIGURE I
DROP TEST TOWER
XV5A NOSE LANDING GEAR

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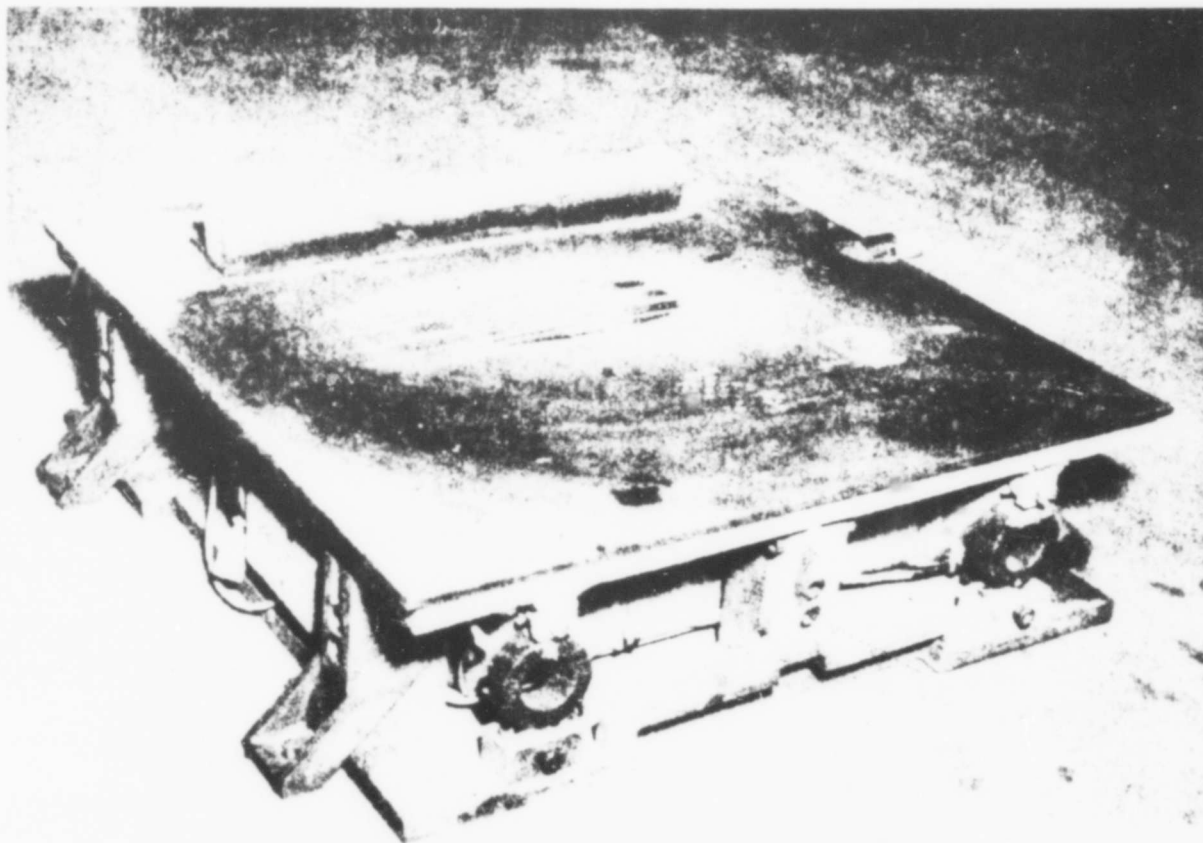
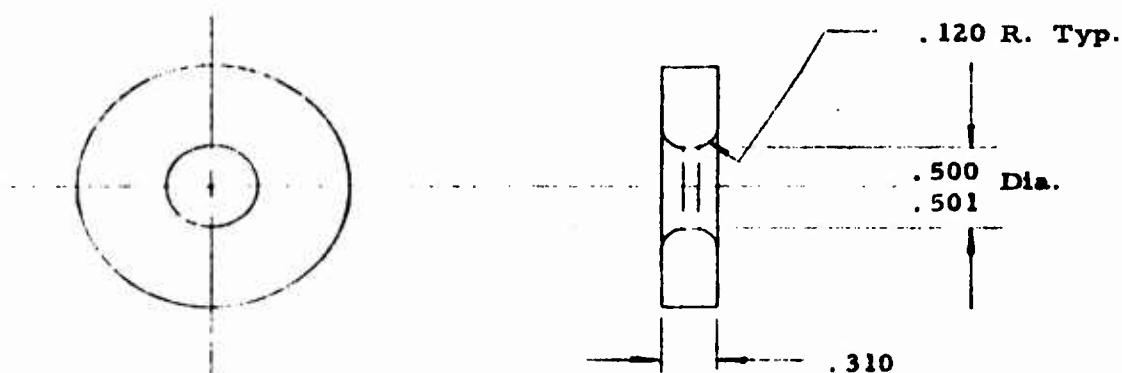


FIGURE II

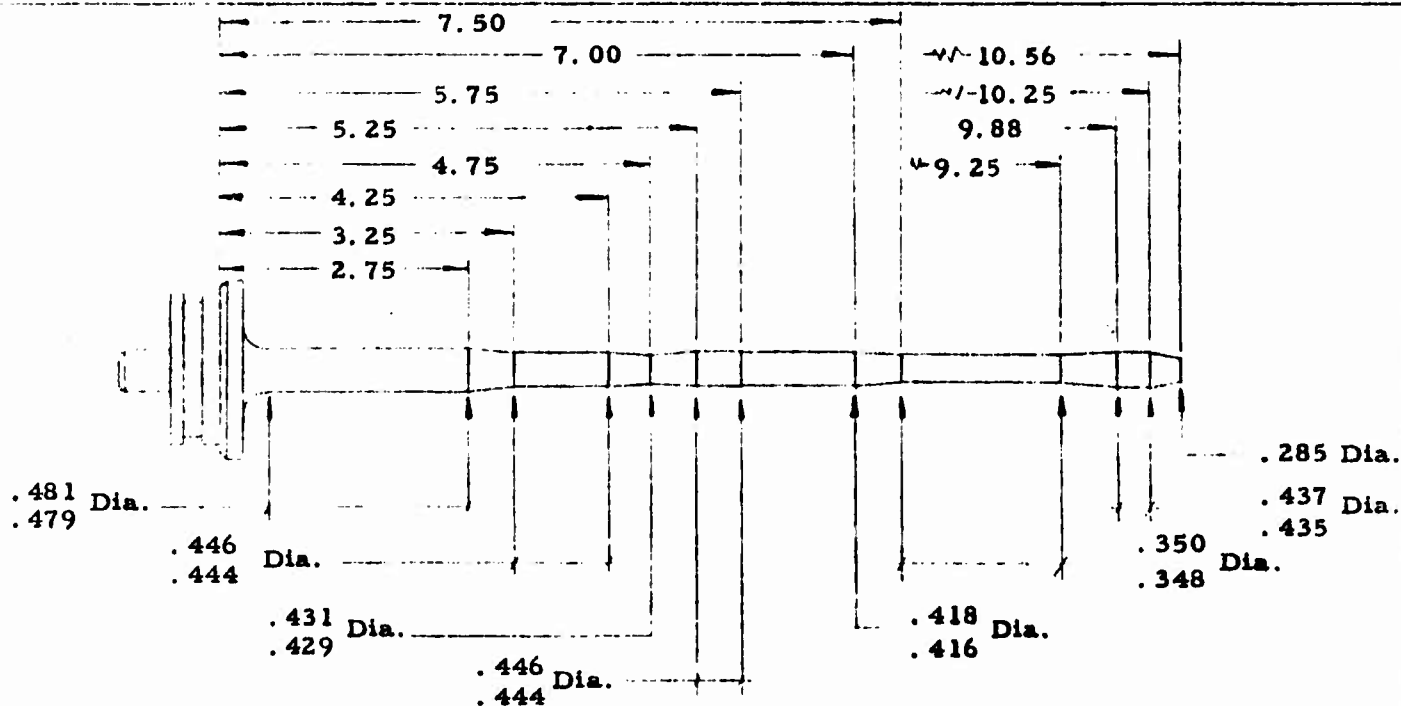
REACTION PLATFORM

10,000 # VERTICAL REACTION

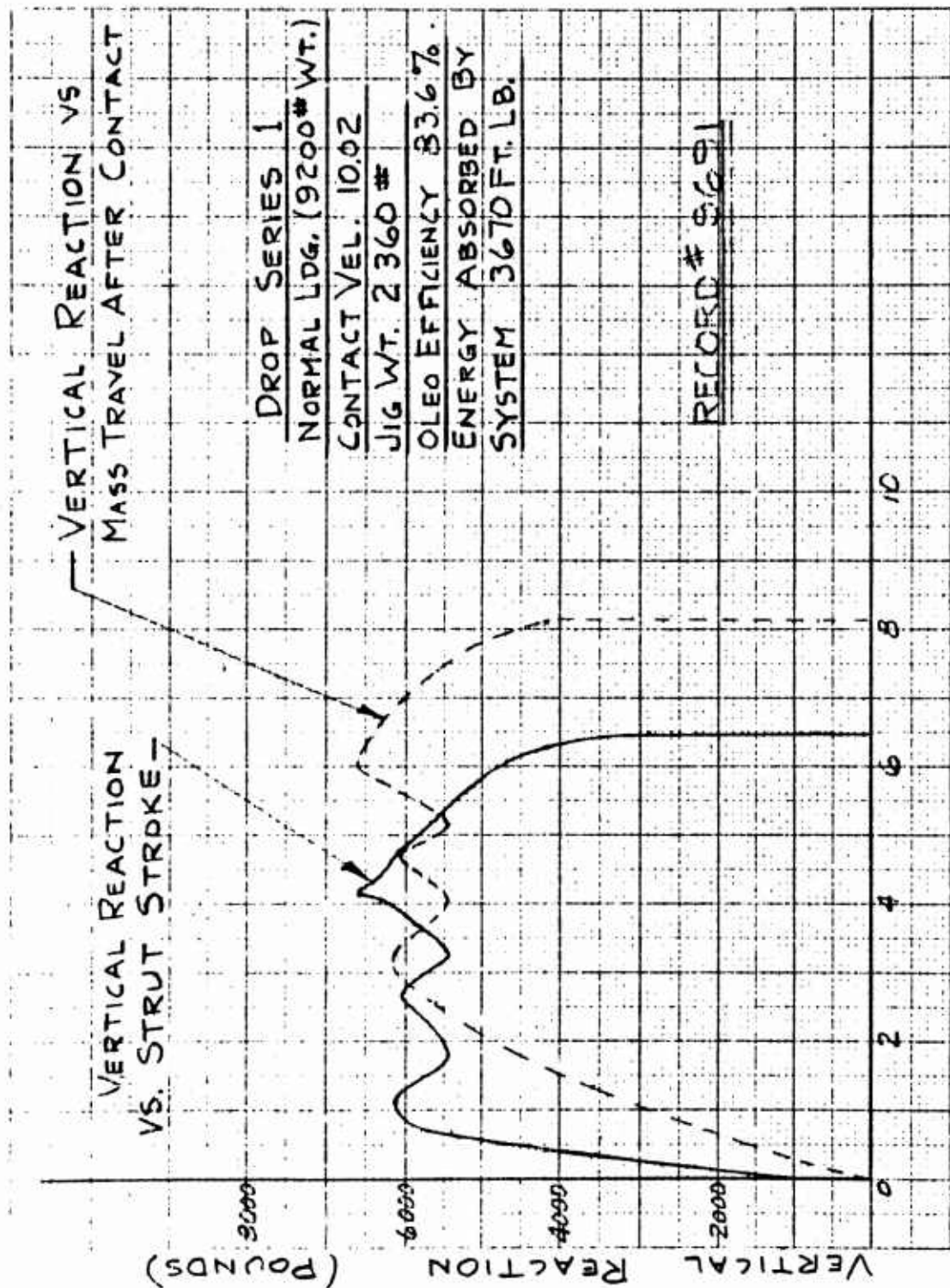
5,000 # HORIZONTAL REACTION

H. W. LOUD MACHINE WORKS, Inc.
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1511L116 ORIFICE CONFIGURATION (FULL SIZE)



1511L125 METERING PIN CONFIGURATION (HALF SIZE)



STRUT STROKE OR MASS TRAVEL ~ INCHES

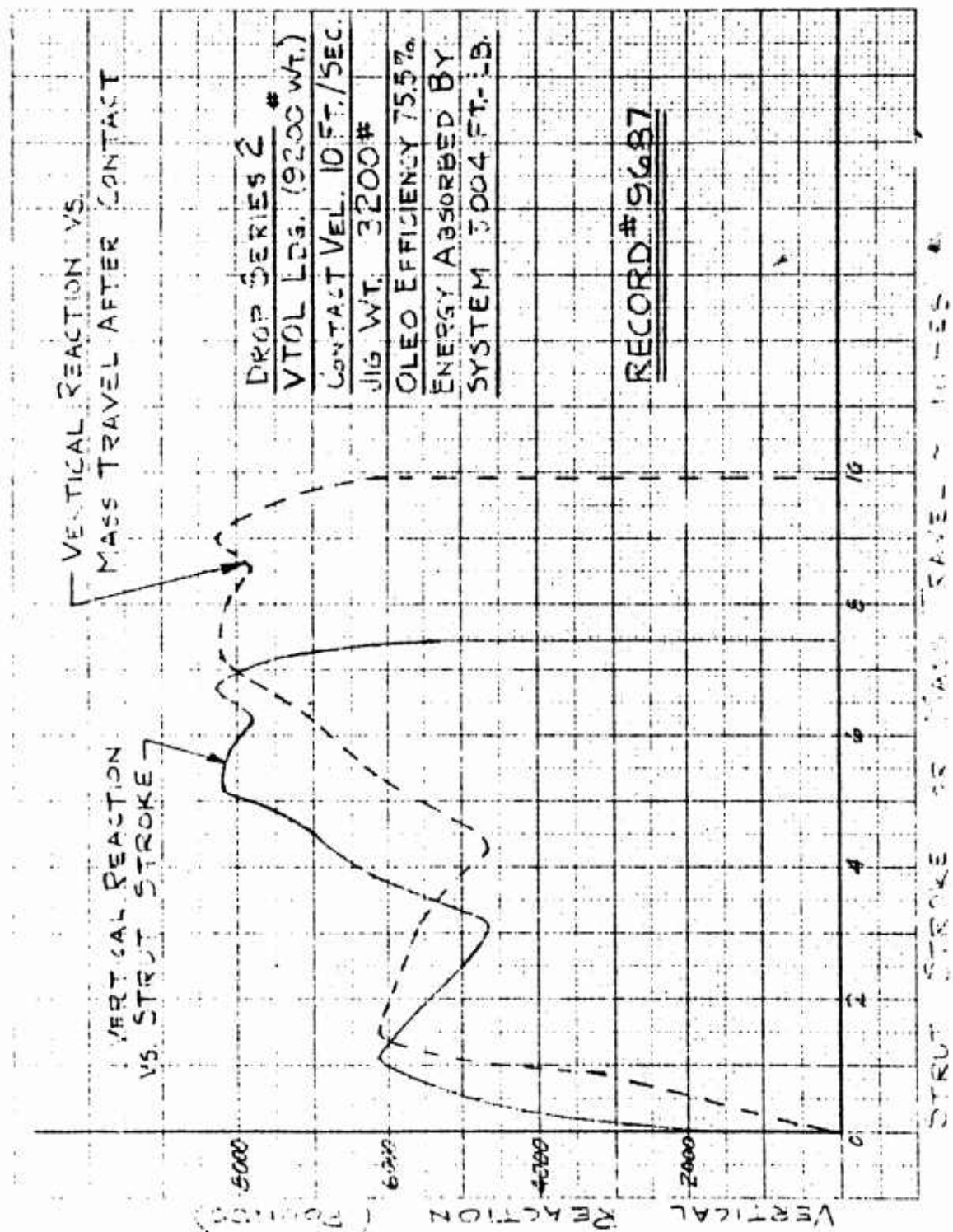


FIGURE V

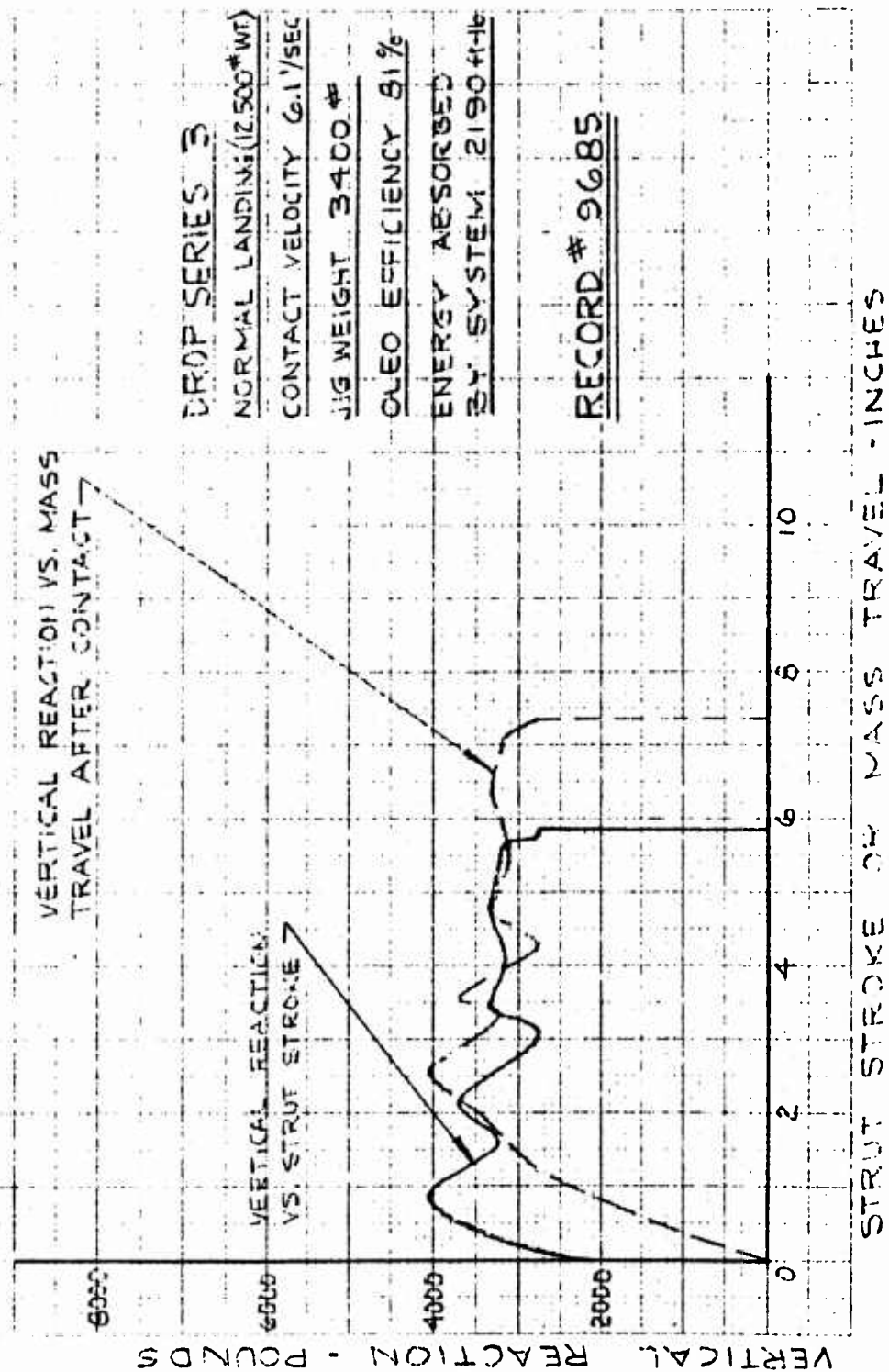


FIGURE VI

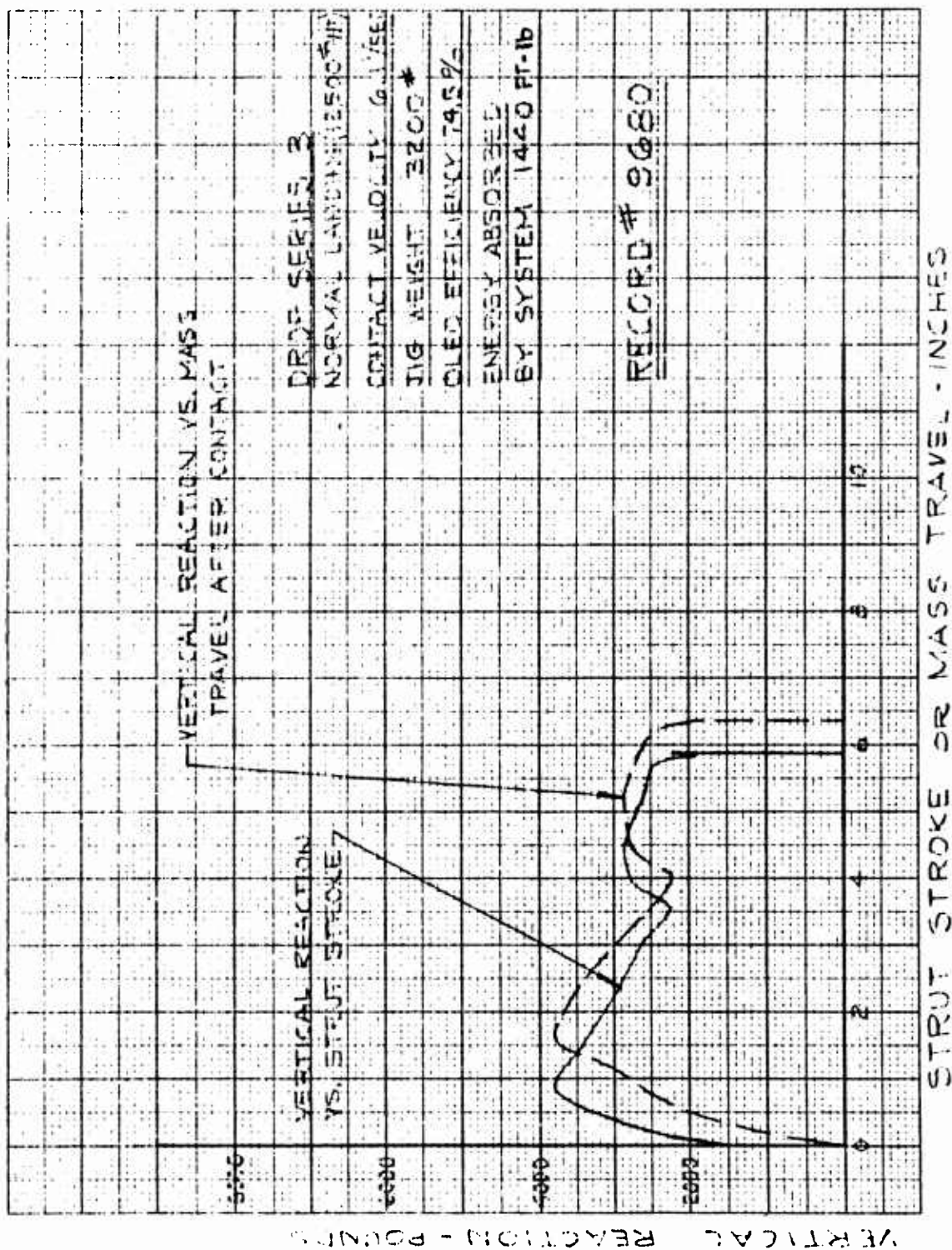


FIGURE VII



.25

.50

.75

1.0

10,000

.25

.50

.75

1.0

5000

1.0

8.0"

.75

.50

.25

1.0

36"

10'/SEC

.75

.50

.50

.25

1.25"

1.0

WHEEL

VERTICAL

DRAG

JIG VELOCITY

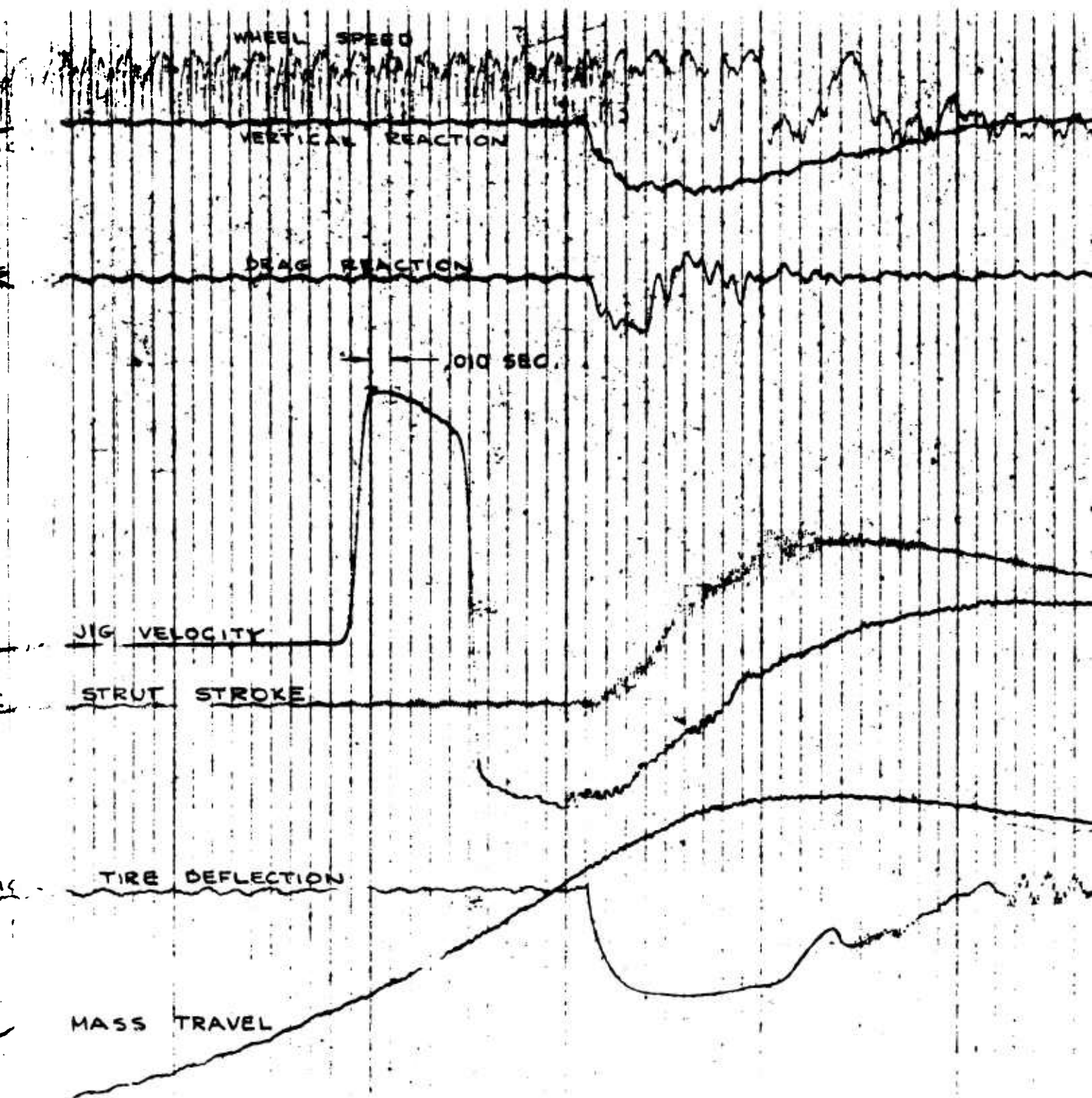
STRUT STROKE

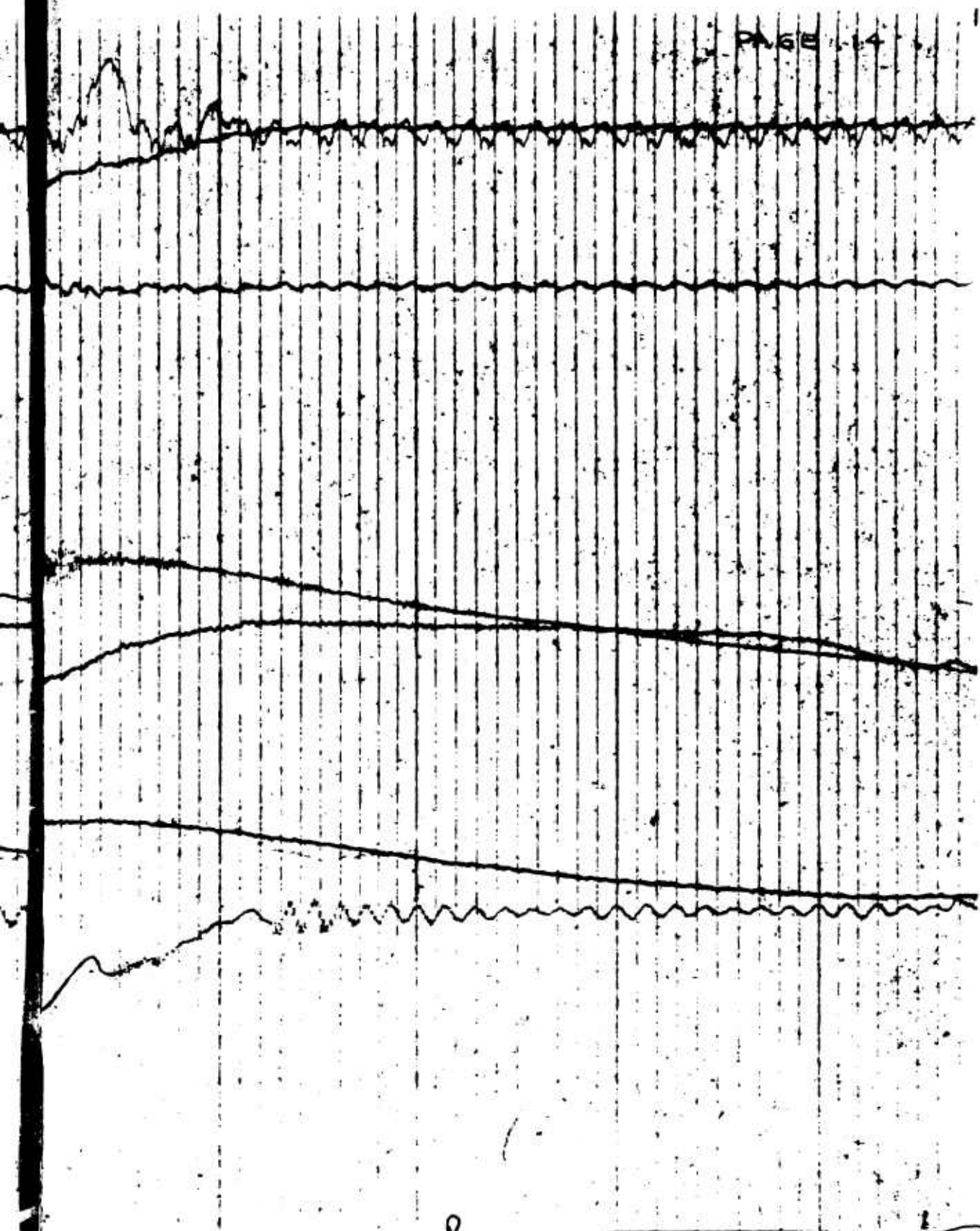
TIRE DEFLECTION

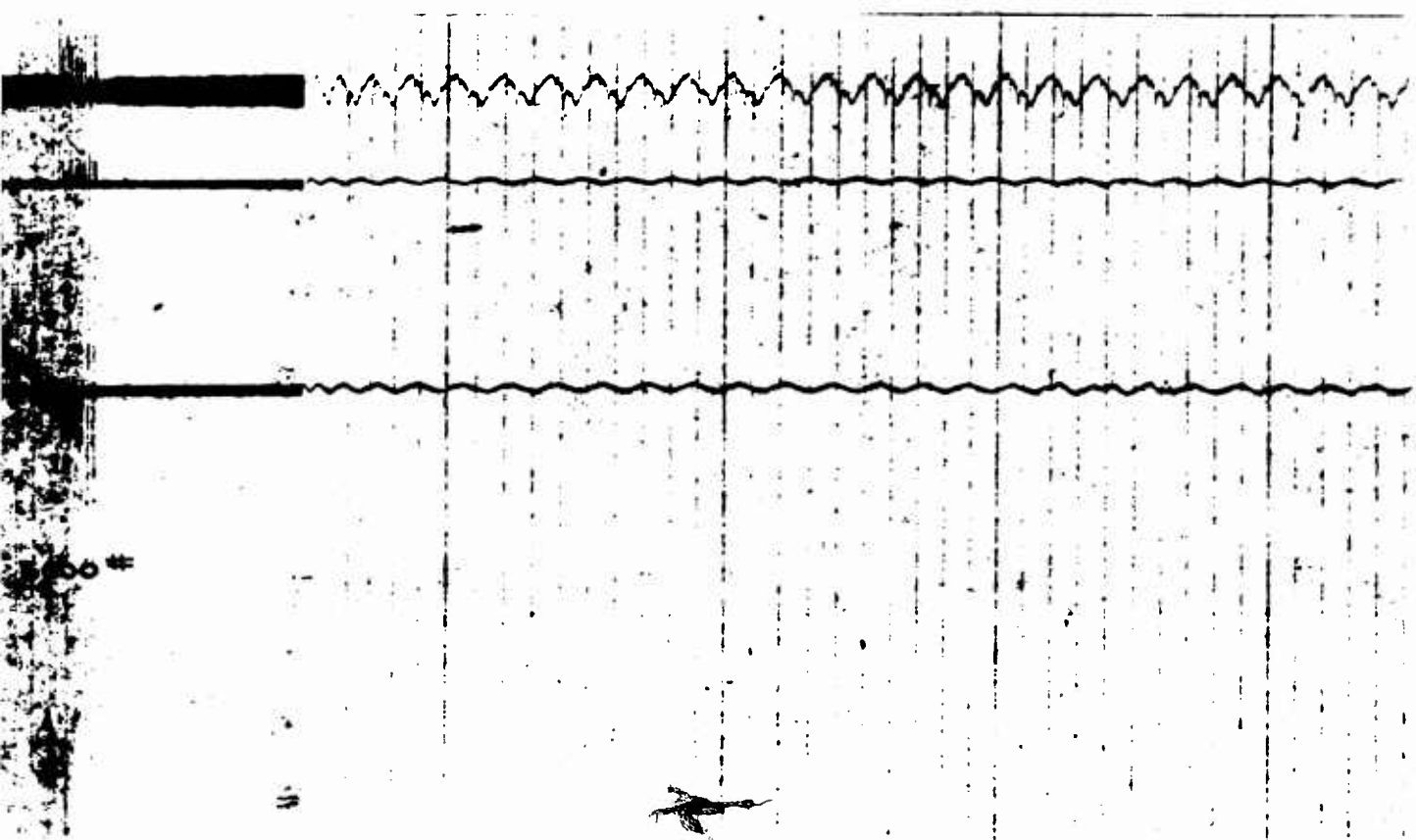
MASS TRAVEL

9691

B





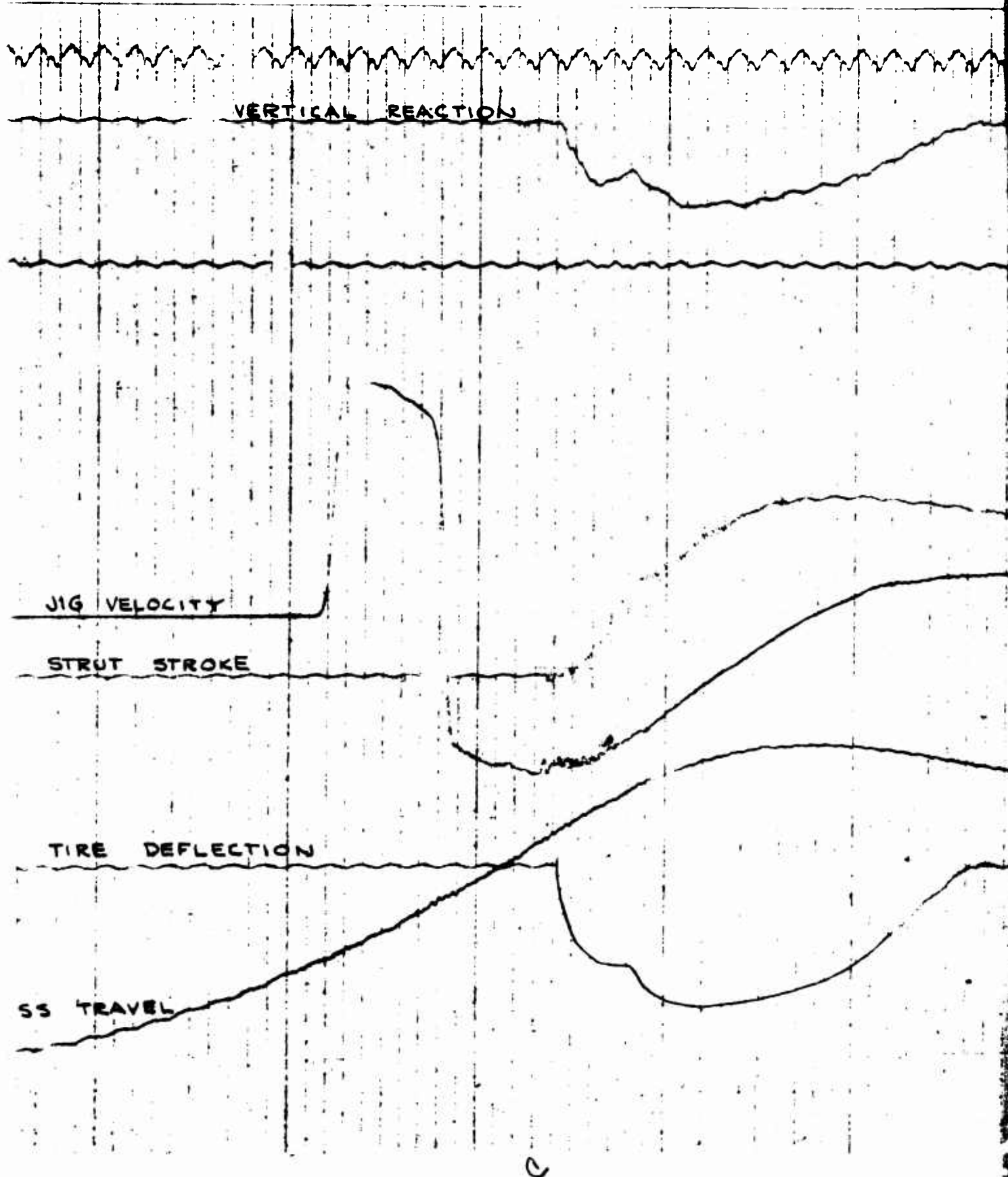


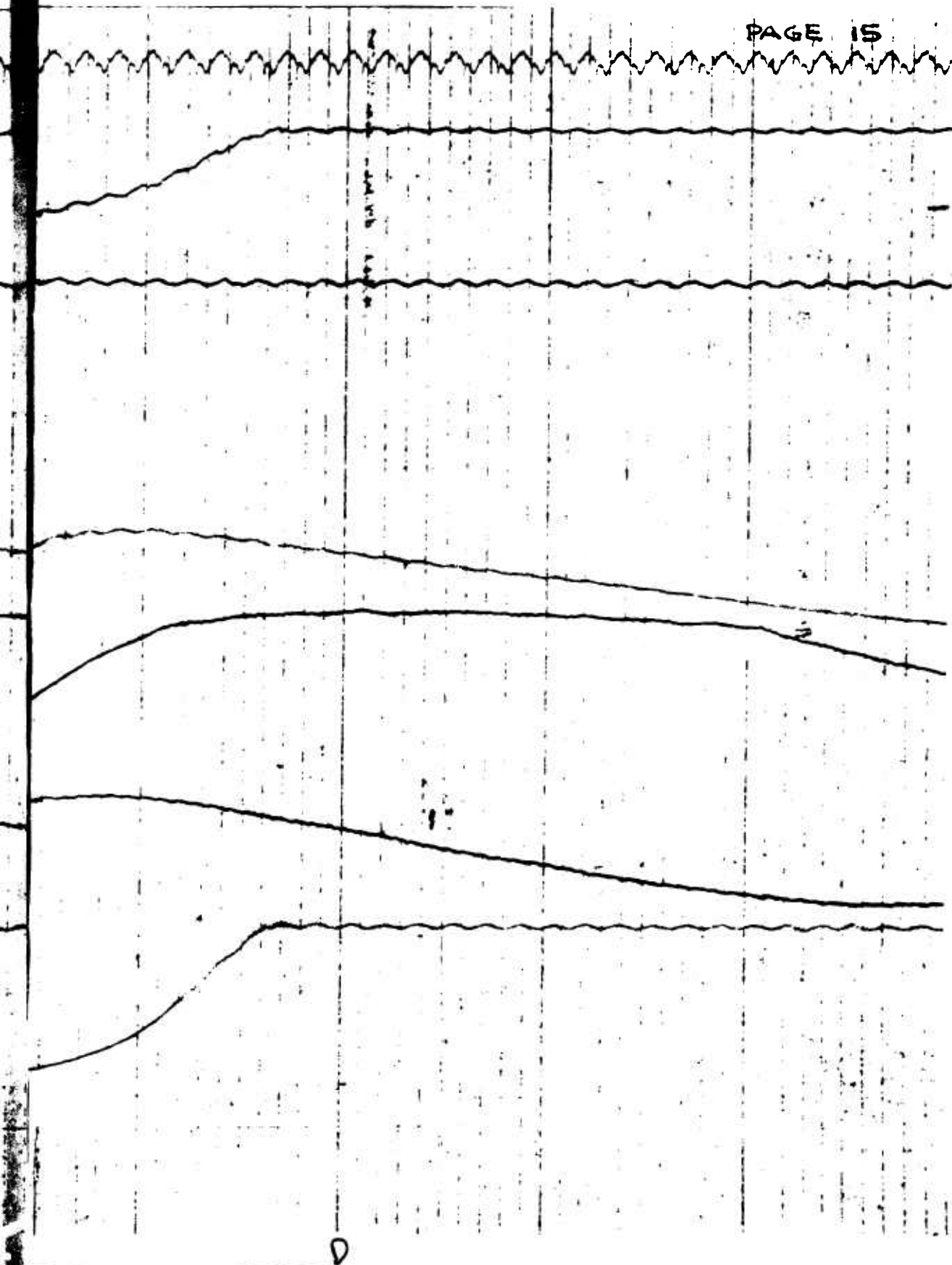
JIG VELOCITY

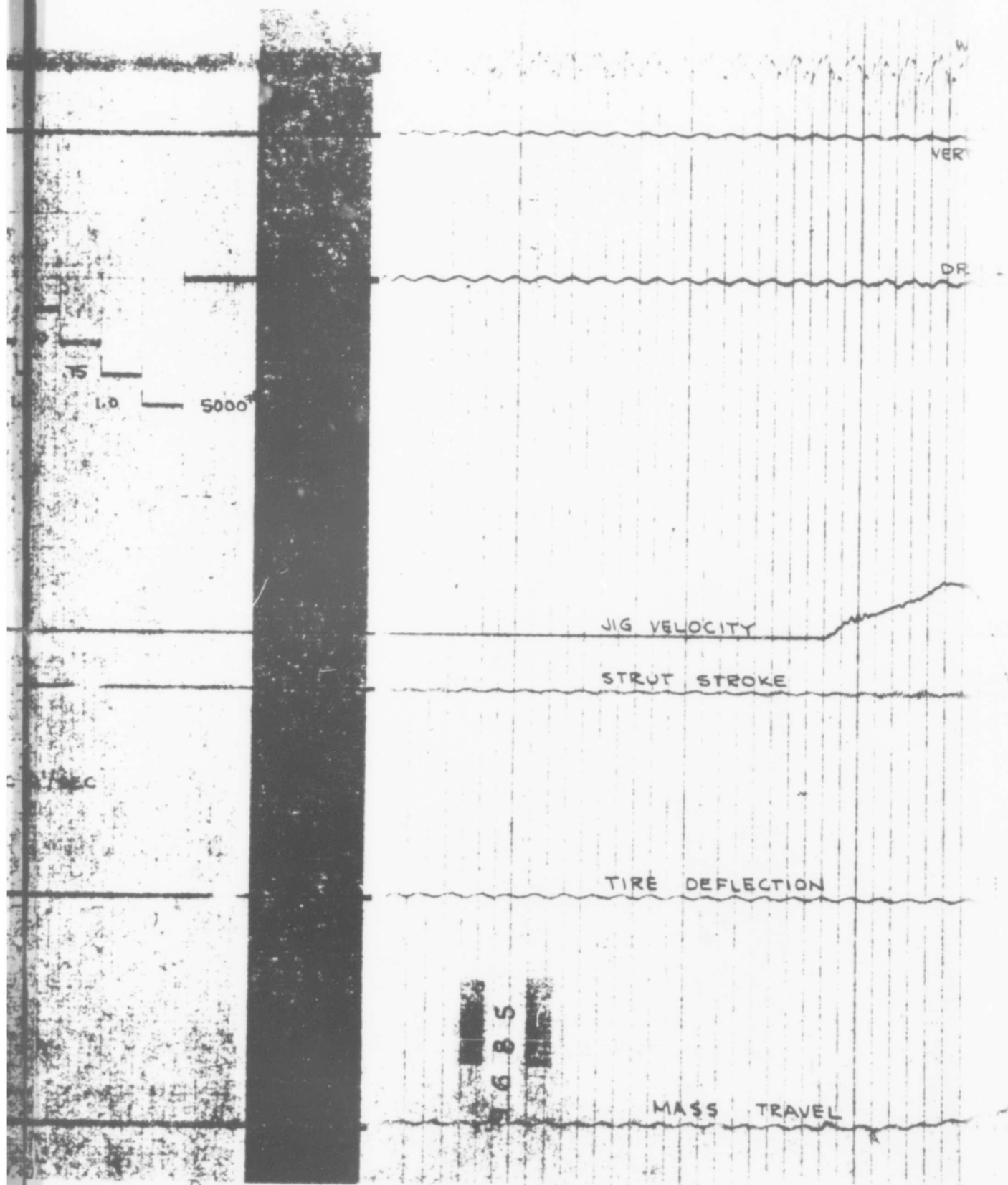
STRUT STR

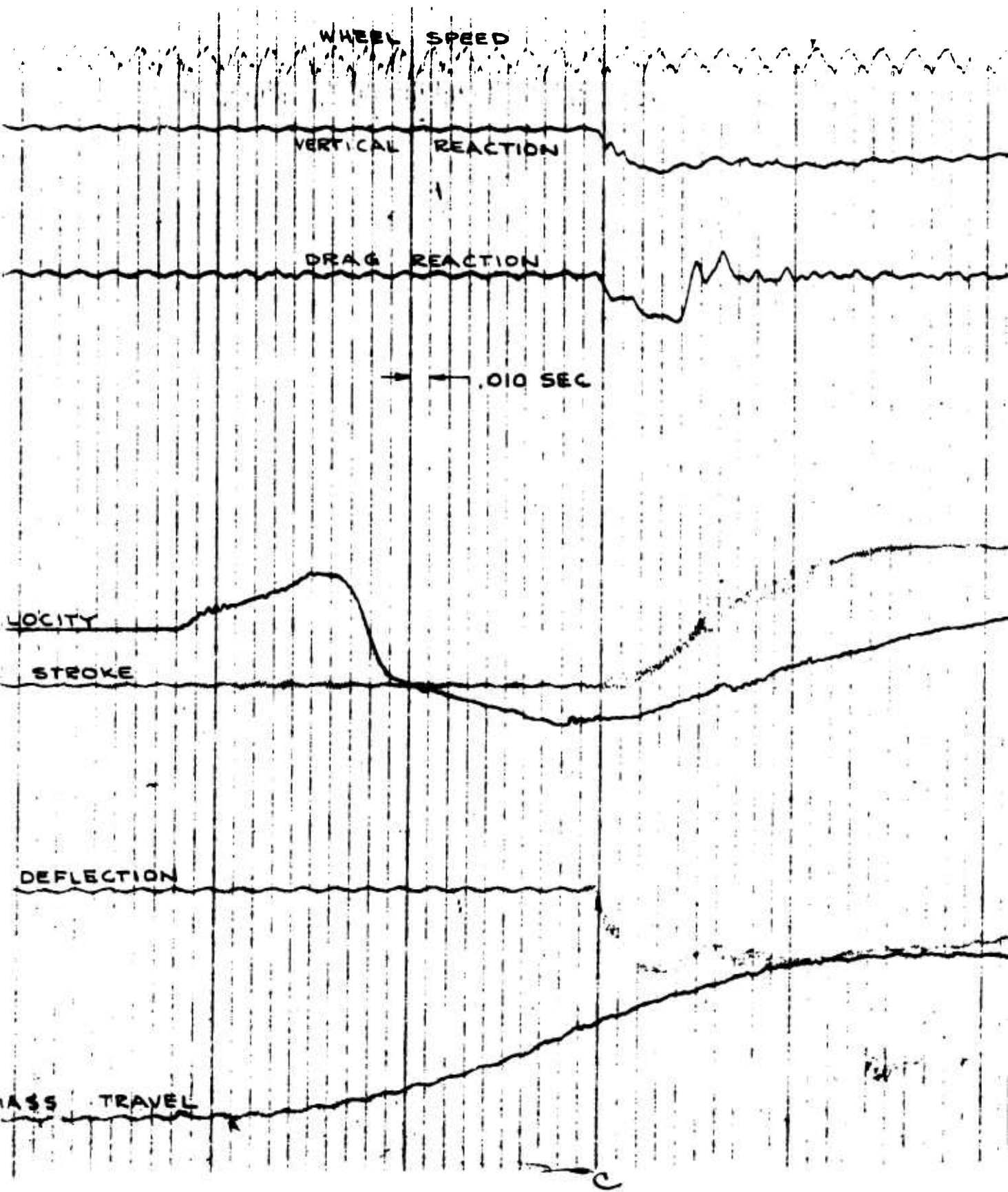
TIRE DEF

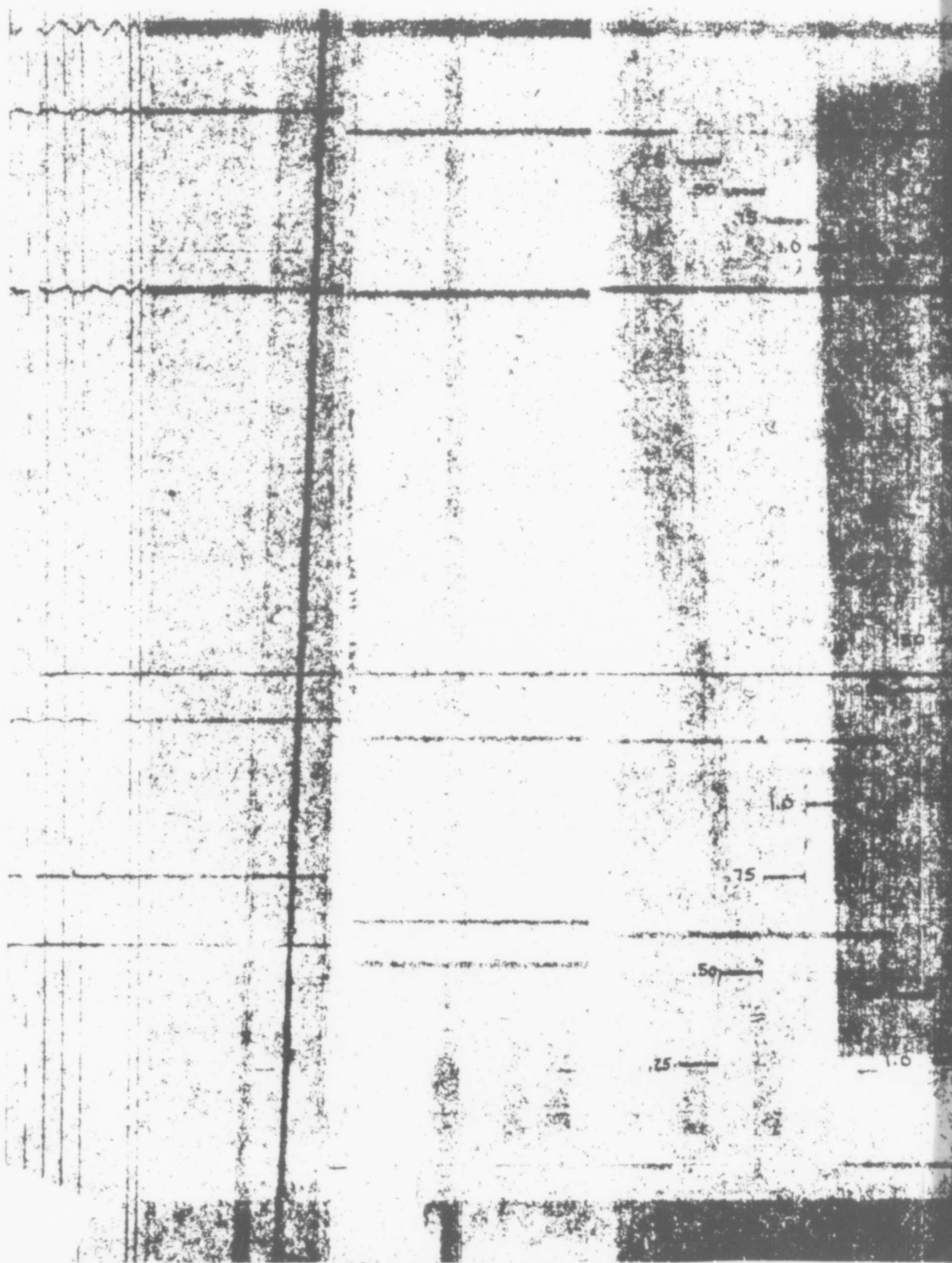
MASS TRAVEL

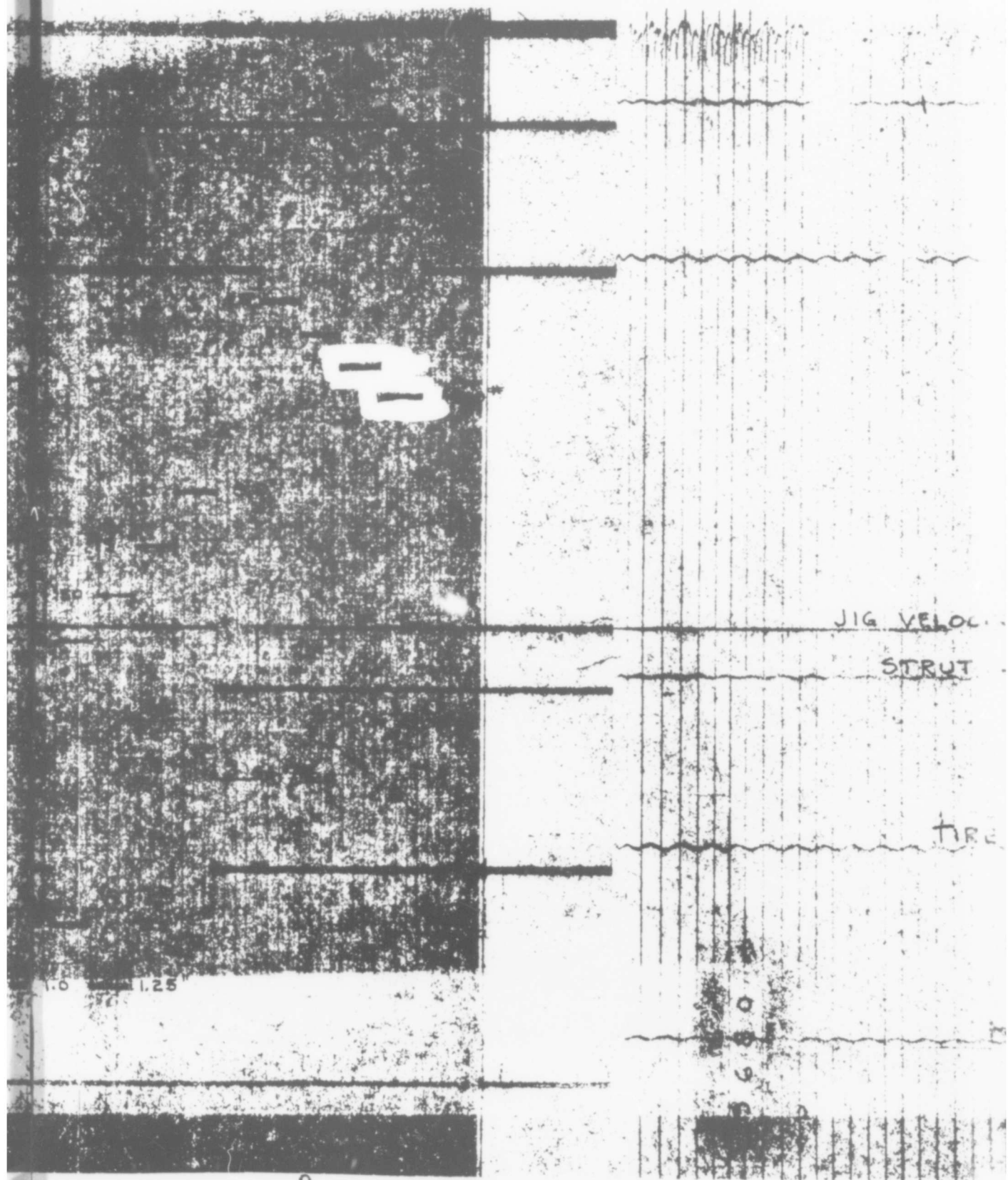












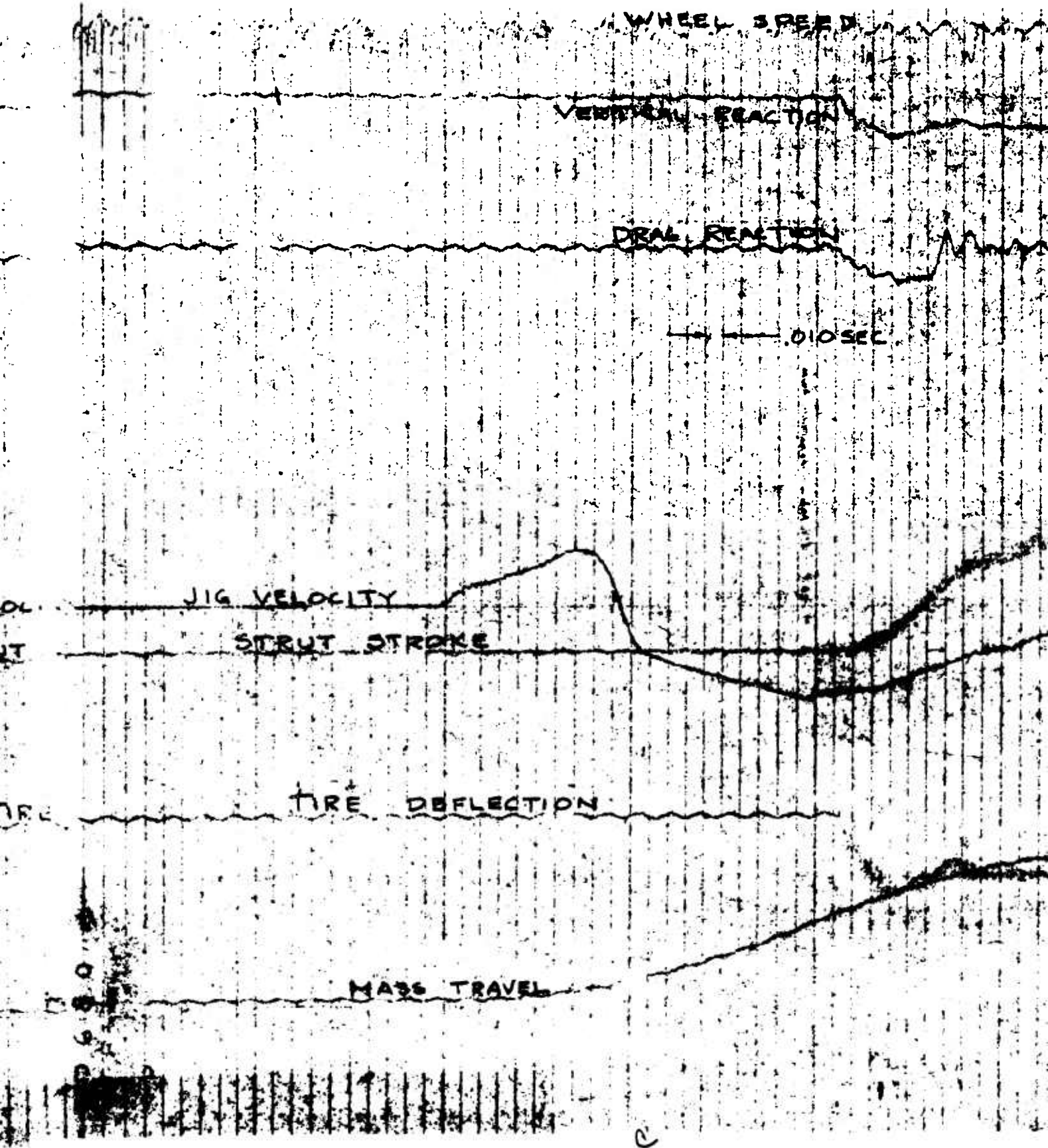
JIG VELOC.

STRUT

TIRE

1.0 1.25

B



PAGE 1

0 SEC

0

17

1511LTR-1

DROP TEST REPORT

Appendix A

H. W. LOUD MACHINE WORKS, Inc.
POMONA, CALIFORNIA

APPENDIX A

DROP TEST PROCEDURE 1511LTP-4, REVISION "A"
TABLE II DROP TEST REQUIREMENTS PAGE 13

1511LTP-4

DROP TEST PROCEDURE

Page 13

(A)

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TABLE II

DROP TEST REQUIREMENTS

Drop Series	Condition	A/P Weight (lbs)	Est Jig Weight (lbs)	Contact Velocity \angle 2% (ft/sec)	Est. Drop Height (in)	Input Energy γ 5% (ft/lbs)	* Wheel Speed (rpm)	Static Weight For Inflation (lbs)	Tire Press (psi)	Max Vertical Ground Reaction (lbs)
1	Normal Ldg.	9,200	2,360	10	19.7	3,690	2,190	* *	155	6230
2	VTOL Ldg.	9,200	3,210	10	19.7	5,000	0	* *	155	8480
3	Normal Ldg.	12,500	3,200	6	7.8	1,800	2,540	* *	155	6230

* Based on 18" tire diameter.

** Use extend air pressure of 154 psig

1511LTR-1

DROP TEST REPORT

Appendix B

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APPENDIX B

WIRE CONFIRMING TEST REQUIREMENT DEVIATION

1511LTR-1

DROP TEST REPORT

Appendix B

H. W. LOUD MACHINE WORKS, Inc.
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CA PLS YOUR CONNECTED ON YOU C. RYAN CO. H. GEN. XXX SERVICE TO
SAN DIEGO CALIF 7-15-53 MSG NO. 23
H. W. LOUD MACHINE WORKS
POMONA, CALIF
ATTN - MR. IRA SMITH

REF - TELEPHONE CONVERSATION BETWEEN HATCHFIELD AND SMITH 7/20/53
REGARDING TEST REQUIREMENT DEVIATION FOR XV5A ROSE LANDING GEAR.
THIS DEVIATION PERTAINS TO DROP TEST SERIES NO. 1, NORMAL LANDING
AND 9,200 LBS. APPLIED WEIGHT AT 10 FEET PER SECOND AND ALLOWS
A VERTICAL GROUND REACTION NOT TO EXCEED 7,000 LBS TO OCCUR AFTER
4 INCHES OF STROKE, ON THE CONDITION THAT THE REACTION IS NOT
CONCURRENT WITH THE MAXIMUM SPIN-UP OR MAXIMUM SPRING-BACK REACTION.
DEVIATION GRANTED AS REF ABOVE.

RYAN AERONAUTICAL CO. TEP/C. ROSE